REMARKS

The foregoing amendments and the following remarks are responsive to the Office Action mailed May 16, 2002. Applicants respectfully requests reconsideration of the present application.

Claims 1, 8, 10, 11, and 13 have been amended. No new matter has been added by these amendments. New claims 21-35 have been added. No new matter has been introduced through the addition of the claims.

Claim Rejections – 35 U.S.C. § 102/103

Applicant teaches and claims a method improving the reliability issues, including blistering and delamination, related to the reaction of fluorine with surrounding materials. Depletion of fluorine from the surface of the fluorinated film reduces the defects related to fluorine reactions. In independent claims 1 and 10, Applicant teaches and claims a method for forming a dielectric, which includes forming a fluorinated film on a semiconductor and exposing the film to a remote plasma in a chemical vapor deposition chamber to deplete the exposed film surfaces of fluorine. The use of a remote plasma reduces or eliminates ion bombardment allowing for greater surface specificity and lower damage to the material being depleted of fluorine.

In new independent claim 21, Applicant teaches and claims a method for forming an interlayer dielectric including depositing a material selected from the group consisting of a-C:F, parylene AF4, carbon-doped SiOF, fluorinated organic polymers, and fluorinated siloxane polymers on a substrate. In new independent claim 29, Applicant teaches and claims a method for forming an interlayer dielectric including depositing a hardmask on the top surface of a fluorine containing material and exposing only the sidewalls of the vias to the reducing plasma.

Claim Rejections - 35 U.S.C. § 102(e)

The Examiner has rejected claims 1, 3, and 10-12 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,281,584 to Ngo et al. Applicant does not admit that Ngo et al. is prior art and reserves the right to swear behind the reference at a later date.

Nonetheless, Applicant believes that the present invention is distinguishable over Ngo et al. Applicant, therefore, respectfully submits that the rejection is improper because Ngo et al. does not disclose each and every element of the invention as claimed in amended claims 1, 3, and 10-12.

Ngo et al. discloses a method for depleting fluorine from the top surface of an SiOF dielectric deposited on a substrate. After the SiOF layer is deposited, vias are etched through the SiOF layer and the structure is subjected to a resist strip and clean step (Ngo et al., column 4, lines 26-30). Ngo et al. then discloses depleting the exposed surface of the SiOF layer using a hydrogen plasma treatment (column 4, lines 30-35 and column 6, lines 18-29). Ngo et al., however, does not teach or suggest using a remote plasma as claimed by Applicant in claims 1 and 10. Thus, Ngo et al. fails to teach or suggest each and every element of Applicant's invention as claimed in independent claims 1 and 10 and dependent claims 3 and 12 that depend from them.

Furthermore, Ngo et al. discloses using only SiOF as a dielectric material. Unlike Applicant's invention as claimed in new independent claim 21, Ngo et al. fails to teach or suggest using a-C:F, parylene AF4, carbon-doped SiOF, fluorinated organic polymers, or fluorinated siloxane polymers as the dielectric film. Ngo et al. also discloses, as discussed above, treating the exposed surfaces with the plasma, including the top surface of the SiOF as well as the via sidewalls. In contrast, Applicant teaches and claims in independent claim 29 forming a hardmask layer on the top surface of the fluorinated material and exposing only the sidewalls of the vias to a reducing plasma. Thus, Ngo et

al. also fails to teach or suggest every element of Applicant's invention as claimed in new independent claims 21 and 29 and claims 22-28 and 30-35 that depend from them.

For the above mentioned reasons, it is Applicant's understanding that Ngo et al. fails to teach each and every element of Applicant's invention as claimed in claims 1, 3, 10 and 12 and new claims 21-35. Applicant therefore respectfully requests the removal of the 35 U.S.C. § 102(e) rejections of claims 1, 3, 10 and 12 and seeks an allowance of these claims and new claims 21-35.

Claim Rejections – 35 U.S.C. § 103(a)

Claims 2, 4-8, 16, and 17

The Examiner has rejected claims 2, 4-8, 16 and 17 under 35 U.S.C. 103(a) as being unpatentable over Ngo et al. (U.S. Patent No. 6,281,584).

Regarding the rejection of claims 2, 4-8, 16 and 17, Applicant respectfully submits that claims 2, 4-8, 16 and 17 are not rendered obvious by Ngo et al. because the reference does not teach or suggest each and every element of these claims.

Claims 2, 4-8, 16 and 17 depend from claims 1 and 10. Thus, for at least the same reasons advanced above with respect to independent claims 1 and 10, Applicant respectfully submits that Ngo et al. does not render these dependent claims obvious.

For the above mentioned reasons, it is Applicant's understanding that Ngo et al. fails to render obvious Applicant's invention as claimed in claims 2, 4-8, 16 and 17. Applicant therefore respectfully requests the removal of the 35 U.S.C. § 103(a) rejections of claims 2, 4-8, 16 and 17 and seeks an allowance of these claims.

Claims 9 and 13-15

The Examiner has rejected claims 9 and 13-15 under 35 U.S.C. 103(a) as being unpatentable over Ngo et al. in view of Naik et al. (U.S. Patent No. 6,245,662).

Regarding claims 9 and 13-15, Applicant respectfully submits that claims 9 and 13-15 are not rendered obvious by Ngo et al. and Naik et al. because the references, whether individually or in combination, do not teach each and every element of these claims.

Claims 9 and 13-15 depend from amended independent claims 1 and 10. Thus, for at least the same reasons discussed above, Applicant respectfully submits that the combination of Ngo et al. and Naik et al. does not render Applicant's invention obvious.

For the above mentioned reasons, it is Applicant's understanding that Ngo et al. in combination with Naik et al. fails to render obvious Applicant's invention as claimed in claims 9 and 13-15. Applicant therefore respectfully requests the removal of the 35 U.S.C. § 103(a) rejections of claims 9 and 13-15 and seeks an allowance of these claims.

If there are any additional charges, please charge Deposit Account No. 02-2666.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE IN THE CLAIMS

1. (Amended) A method of forming a dielectric, comprising:

forming a fluorine containing film on a substrate; and

placing the substrate into a reaction chamber and exposing the fluorine containing film to a reducing plasma**, wherein the reducing plasma is formed in a chamber remote from the reaction chamber containing the substrate**.

8. (Amended) The method of Claim 7, wherein the fluorine containing film comprises a material selected from the group consisting **of** a-C:F, parylene AF4, carbon-doped SiOF, fluorinated organic polymers, fluorinated siloxane polymers, and SiOF.

10. (Amended) A method of forming an interlayer dielectric in an integrated circuit, comprising:

depositing a fluorinated material on a substrate;

forming via openings in the fluorinated material; and

exposing the fluorinated material to a hydrogen containing plasma **in a reaction chamber, wherein the plasma is formed in a chamber remote from the reaction chamber containing the fluorinated material.**

11. (Amended) The method of Claim 10, wherein the fluorinated material **[comprises] is selected from the group consisting of a-C:F, parylene AF4, carbon-doped SiOF, fluorinated organic polymers, fluorinated siloxane polymers, and** SiOF.

13. (Amended) The method of Claim **[10]** 11, wherein the material comprises parylene-AF4.

21. (New) A method of forming an interlayer dielectric in an integrated circuit, comprising:

depositing a material on a substrate, wherein the material is selected from the group consisting of a-C:F, parylene AF4, carbon-doped SiOF, fluorinated organic polymers, and fluorinated siloxane polymers;

forming via openings in the material; and

exposing the material to a reducing plasma.

22. (New) The method of Claim 21, further comprising exposing the material to the reducing plasma in a ~~reaction chamber~~, wherein the reducing plasma is formed in a chamber remote from the reaction chamber containing the ~~material~~.

23. (New) The method of Claim 21, further comprising depositing a conductive material in the via openings.

24. (New) The method of Claim 21, wherein the material comprises parylene-AF4.

25. (New) The method of Claim 24, further comprising depositing a hardmask layer over the parylene-AF4 prior to forming the via openings.

26. (New) The method of Claim 25, wherein depositing the hardmask comprises forming a layer of silicon nitride over the material.

27. (New) The method of Claim 21, wherein the plasma is formed in a reaction chamber from ammonia and argon at a pressure between 1 mTorr and 50 Torr and an RF power of between 100 watts and 500 watts.

28. (New) The method of Claim 27, wherein the ammonia is passed into the reaction chamber at a flow rate in the range of 10 sccm to 3 liters/minute.

29. (New) A method of forming an interlayer dielectric, comprising:

forming a fluorine containing film on a substrate having a top surface;

depositing a hardmask layer on the top surface of the fluorine containing film;

forming via openings in the fluorine containing film, wherein the via openings define sidewalls; and

exposing the sidewalls to a reducing plasma.

30. (New) The method of Claim 29, further comprising exposing the sidewalls to the reducing plasma in a reaction chamber, wherein the reducing plasma is formed in a chamber remote from the reaction chamber containing the fluorine containing film.

31. (New) The method of Claim 29, wherein the fluorine containing film comprises a material selected from the group consisting of a-C:F, parylene AF4, carbon-doped SiOF, fluorinated organic polymers, fluorinated siloxane polymers, and SiOF.

32. (New) The method of Claim 29, further comprising depositing a conductive material in the via openings.

33. (New) The method of Claim 29, wherein depositing the hardmask comprises forming a layer of silicon nitride over the top surface of the fluorine containing film.

34. (New) The method of Claim 29, wherein the plasma is formed in a reaction chamber from ammonia and argon at a pressure between 1 mTorr and 50 Torr and an RF power of between 100 watts and 500 watts.

35. (New) The method of Claim 34, wherein the ammonia is passed into the reaction chamber at a flow rate in the range of 10 sccm to 3 liters/minute.